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ENTOMOLOGY.¹**On the larvæ and pupæ of *Hololepta* and *Pyrochroa*.—**

Aside from those of direct economic importance, the larvæ of North American Coleoptera have received too little attention from entomologists, and many of our common beetles are quite unknown in their early stages, while others have received passing notice in text-books or agricultural reports, with here and there a figure, and sometimes a few words of description, more or less vague. Many of the injurious ones have been, however, investigated in the most thorough manner by our best students of insect life.

The two species treated of in the present paper have not before been given space in our literature beyond, in one case, a short note. It has, therefore, been thought fit to furnish detailed descriptions and figures for the use of those who may wish to identify specimens in their possession.

HOLELEPTA FOSSULARIS Say. Plate XXVI, figs. 1, a, b, c, d.

Color of larva nearly white, head chestnut, prothorax with a triangular space, occupying most of the upper surface, a little lighter than the head. Back with a dark line for the greater portion of the length where the viscera show through.

Form elongate, somewhat flattened; length 17.5 mm.

Head castaneous, quadrate, broader than long; above strongly flattened, with four impressed lines on the front and an impressed space near the base of each antenna, from which a line of punctures runs to the base. Anterior margin produced, truncate in front, and with a lobe over each mandible. Beneath, less flattened, with a broad, deep impressed space on the gular region, extending in the form of a narrow groove to the base.

Antennæ arising from the sides of the head, immediately behind the base of the mandibles, four-jointed, the first joint very short, sunken, the second long, the third shorter, subtriangular, with three papillæ at end, fourth joint again shorter, elongate oval. There are, apparently, no bristles, except two short and inconspicuous ones at the tip of the last joint.

Eyes are, apparently, altogether wanting.

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Mandibles stout, rather long, curved, with a strong, rounded tooth before the middle.

Maxillæ composed of a long, stout basal piece, heavily bristled, especially on the inside, a shorter second joint, which bears a one-jointed appendix, tipped by a bristle, on the outside; third, fourth and fifth joints subequal, the last two, however, a trifle longer and more slender.

Mentum borne on a tuberculiform base, elongate, wider near the tip, palpi two-jointed terminal joint longer.

Prothorax corneous, transverse, sides and base somewhat rounded, apex nearly truncate, median line distinct, rather deep, a deeper impression each side external to which is a vague foveate impression. Beneath with two deeply impressed lines strongly convergent anteriorly, posterior to which are two foveæ.

Meso- and metathorax much shorter than the prothorax, membranous with a long, crescentic, horny scute at middle, both above and below, and smaller ones at sides. Each of these segments bears a lateral bristle.

Abdomen of nine segments, which are protuberant near the middle of the sides and transversely wrinkled, armed with two lateral and one ventro-lateral bristle on each side. Each segment except the last is granulato-spinose on the scutes of the under surface; the last bears two bi-articulate appendages, each armed with five bristles, as shown in the figure. The anus is inferior.

Spiracles in nine pairs, the first situated beneath the anterior mesothoracic angles, the others in segments 1 to 8 of the abdomen, near the anterior margins and somewhat ventro-laterally.

Legs small, weak, slender. The coxæ are rounded, imperfectly chitinized, the trochanter distinctly marked, femur somewhat creased on the edges, tibiæ shorter, slightly bristled, claw single with two short bristles at about the middle of the length.

The pupa is white, 10 mm. in length and of the same general shape as the beetle, but with a more pointed abdomen; the meso-metasternal area is coarsely punctured.

Nearly full-grown larvæ of this species were found under the bark of an old cottonwood log near the end of March, between the thin layers next to the wood. In captivity they fed upon the pupæ of Diptera taken in the same situation. After several days the largest one constructed a case of small pieces of bark; the dimensions were 14 by 7 mm., the outside rough, but the inside perfectly smooth. In this case the change to a pupa took place after a rest of above a week.

PYROCHROA FLABELATA Fabr. Plate XXVI, figs. 2, a, b, c, d, e, f.

Color of full-grown larva clear, light yellow, the head, especially the mouth parts, and the terminal processes castaneous.

Form elongate, much depressed, sides sub-parallel, slightly broader behind, segments with dorso- and ventro-lateral bristles. Terminal segment corneous with two stout processes directed upward and backward. Length 34.5 mm.

Head corneous, free, the sides strongly rounded, front produced at middle, labrum distinct, tip sinuate more prominent at middle, anterior margin strongly bristled, suture very slightly sinuate. Top of head with a depressed space surrounding a large tubercle, anteriorly with transverse striations and two tolerably distinct longitudinal lines.

Eyes consist of four ocelli on each side of the head, just posterior to the antennæ. The three anterior ones in each group are arranged in a slightly oblique curved line, back of the middle of which the fourth is placed.

Antennæ lateral, situated behind the base of the mandibles, four-jointed, the first joint stout, short, the second long, third and fourth subequal, together somewhat longer than the second. The fourth joint is much more slender than the third, and all are strongly bristled.

Mandibles extremely stout and heavy, deep, the tip emarginate, internally strongly toothed, as shown by the drawing.

Maxillæ large, strong corneous; the lobe is sinuate on the inner margin and armed with bristles, those near the end arrayed in rows, the inner apical ones recurved. The palpi are stout, the second and third joints about equal and separately longer than the first; all are bristly.

Mentum of the form shown in fig. 2 f. The shaded portion is thicker and more perfectly chitinized than the remainder, and has every appearance of being divided by sutures from the underlying and superimposed pieces.

Prothorax about equal in width to the head, the sides nearly straight, except at the angles, where they are abruptly directed inwards. Median line distinct with a fovea each side anterior to the middle and crossed in front of these by a fine transverse line. Beneath with two strongly impressed lines which, originating between the coxæ, diverge strongly in front and attain the margin near the anterior angles, the triangular space thus enclosed being also bistrate at middle.

Mesothorax broadest near the base, more convex than the prothorax, with distinct median line, and, on each side of this, a vague double fovea,

slightly behind the middle. Anteriorly there is a fine transverse line crossing the median one at right angles. Beneath is a smooth subquadrate space, usually bounded at sides and behind (except for a short distance at middle) by broad, deeply impressed lines.

Metathorax similar, but the lines beneath effect a junction at the middle.

Abdomen with the first seven segments quite similar in form, subangulate at the sides, median dorsal and anterior transverse lines distinct, the former more so. Beneath is a very well marked submarginal plica. The eighth segment is larger, longer, more perfectly chitinized, sides slightly rounded. Median dorsal line very distinct, with a less distinct oblique one on each side. Beneath there is an impressed median line which has posteriorly a slightly elevated carina on each side; external to this is a sinuous broader line each side, and outside of this again a very deep impression which extends from a point distant about one-fifth from the basal lateral margin to the posterior angle of the segment. The anal segment is small, carinate, more distinctly at base, visible only from beneath, being overlaid by a corneous plate bearing two spinose and granulate processes. Viewed from above the space between these processes is somewhat semicircular in outline, and the two *cul-de-sacs* between them are distinctly visible. From beneath the processes look almost straight and the *cul-de-sacs* do not appear. The accompanying figure will give a much better idea of this complicated structure than a description can convey.

Spiracles in nine pairs, the first situated in the mesothorax under the anterior angles, the rest abdominal. The pair on the first abdominal segment is dorso-lateral, the next lateral, and the remainder (in segments 3 to 8) are ventro-lateral; all except the last pair, which are behind the middle, are placed nearer the anterior than the posterior margin of the segment.

Legs stout, coxæ not very prominent, femora strong, broader at tip and compressed within, tibial pieces subcylindrical, claws single, long, curved, with an indistinct blunt tooth and a bristle near the base. The suture between the femur and trochanter is well marked, and these as well as the tibiæ are rather sparsely bristled.

Larvæ of the above mentioned species were taken at Iowa City on the 13th of April from beneath the bark of a rotting elm log. On the 7th of May one of them changed to an elongate white pupa, 16 mm. in length, which had the power of moving very rapidly about on its back, tail foremost. It was very sensitive, a slight touch on any of

the bristles sufficing to set it in motion. The beetle appeared on May 16th.

In a short note on page 76 of the third volume of *PSYCHE*, Mr. H. L. Moody has given us a means of distinguishing the larvæ of four of the species of the family Pyrochroidæ that he has raised. The larva of *Schizotus cervicalis* he says is of a smoky tint, while the remaining three (mentioned hereafter) are yellow; of these, *Dendroides canadensis* has long, slender, curved processes nearly one-third longer than the basal portion, and the *cul-de-sacs* not visible from above; *D. concolor* has stouter, nearly straight processes hardly longer than the basal portion, and the tips are obliquely cut off on the inner side, while the *cul-de-sacs* are just visible (by the projecting lower margin) from above. In *Pyrochroa flabellata* the processes are nearly straight on the inner edge when viewed from below, and short, strongly dentate; the *cul-de-sacs* are very large, plainly visible from above. I notice that the length of the processes is subject to some little variation, but no doubt these characters will hold good in general.

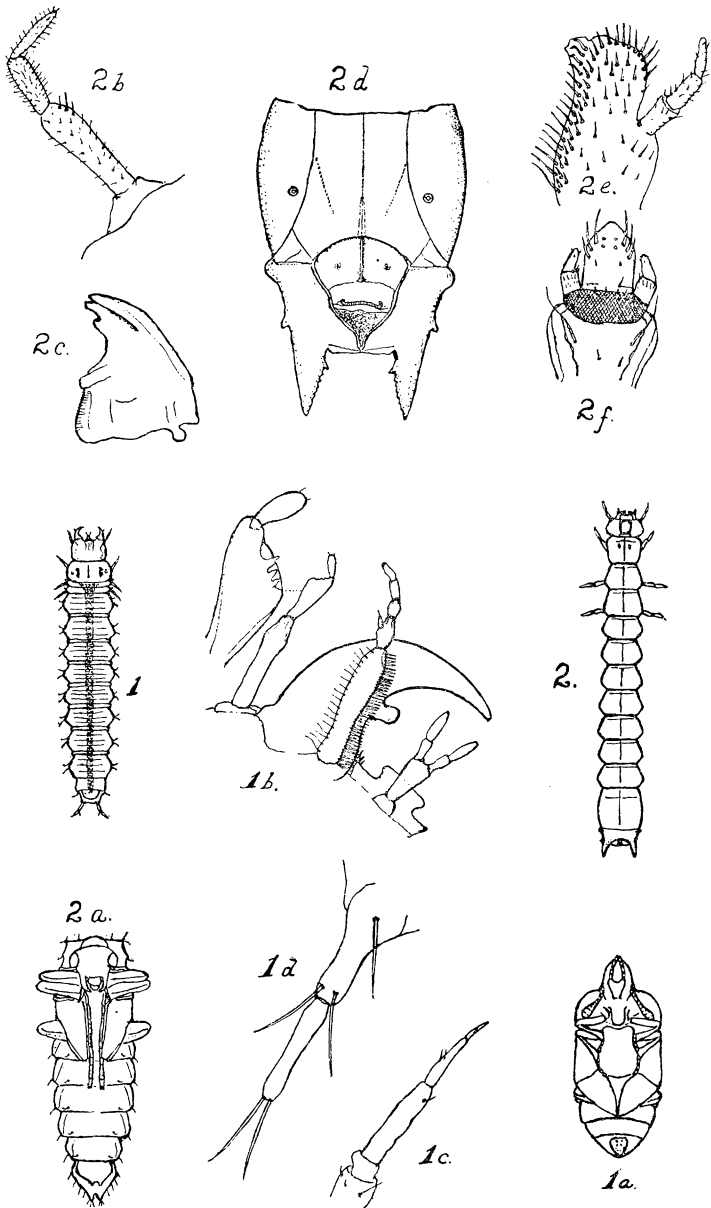
EXPLANATION OF PLATE.

Fig. 1. *Hololepta fossularis* Say, larva; *a*, pupa; *b*, mouth and antenna from below; *c*, anterior leg; *d*, caudal appendix.

Fig. 2. *Pyrochroa flabellata* Fabr., larva; *a*, pupa; *b*, antenna; *c*, mandible; *d*, terminal portion of abdomen from below; *e*, maxilla; *f*, mentum.

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PLATE XXVI.



Hololepta and Pyrochroa.